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No. 3: A FAUNAL INVESTIGATION OF KING TOWNSHIP, YORK COUNTY, ONTARIO, BY L. L. SNYDER AND E. B. S. LOGIER.

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A FAUNAL INVESTIGATION OF KING TOWNSHIP, YORK COUNTY, ONTARIO*

I. GENERAL INTRODUCTION

By L. L. Snyder and E. B. S. Logier
Royal Ontario Museum of Zoology

Although King township, York county, is so close to Toronto as to justify its inclusion in that rather indefinite area, the Toronto region, its fauna has not previously received specific treatment. Its southeastern corner is but thirteen miles from the present northern city limit. In a few respects, such as the extent of uncultivated wooded and swamp land, the territory is unique for the general region and it has appeared desirable to make a survey of the higher forms of animal life to be found there and present a list for future reference.

The township is bounded on the south by Vaughan township and on the west by the Peel county line. The Holland river forms its northern boundary while Yonge street marks most of its eastern limits. The original township survey was made in 1800, although subsequent alterations in 1851 gave it its present outline. It is said to embrace a total of 86,014 acres (*History of Toronto and County of York*, 1885).

The whole of the area is characterized by irregular, morainic ridges which run approximately east and west and give a local variation of altitude of over four hundred feet. The highest point in the township is 1,150 feet above sea level (*Dept. of Nat'l. Defence, Topographic map*, No. 59). The irregularity of the land surface prohibits cultivation in some sections as does also the heavy mixture of glacial boulders and stones in the soil. In other sections the soil is good but this constitutes perhaps only 30 or 35 per cent. of the total area. The moraine hills form the height of land between Lake Ontario and Lake Simcoe, the drainage to the south giving rise to tributaries of the Humber river, while on the north the drainage is through the Holland river to Lake Simcoe and thence to Georgian bay.

A few small moraine lakes or ponds occur more or less in alignment across the township. About some of these, in the drainage valleys and more particularly along the Holland river, swamp and bog conditions are

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found. Such conditions contribute to the high percentage of untilled land. A few of these lakes have no surface outlet but owing to their constant levels appear to have some subterranean drainage.

The Holland river valley is the most interesting physiographical feature in King township. It is wide, and in the main has not been formed by surface erosion, but is rather a remnant bay of glacial Lake Algonquin—that greatest of glacial lakes, the basin of which included that of Lake Simcoe, Georgian bay and all of the upper Great Lakes. After the shrinking of Lake Algonquin the depression was left which now determines the course of the Holland river. The fall between the source and mouth of the river is very slight, resulting in slow drainage in the northern part of the township. This has given rise to the swamp and bog conditions, which in turn have affected the animal life to be found there.

The forest of the region has been largely cut over, either removed completely or the better lumber-trees taken out. In the *History of Toronto and County of York* (*loc. cit.*) the road from Lloydtown to Kettleby, which runs in a general east-west direction in the northern part of the township, is described as passing through a section "timbered with cedar, hemlocks and pine, with a little hardwood intermixed." In another paragraph in the same volume the forest, especially in the hilly sections, is referred to as being "pine and hardwood intermixed." At this time, 1851, large tracts of land were still wooded but inroads were steadily being made by settlers. William H. Smith (1851) has given us an early conception of the deforestation in a brief description of the country near the village of Kettleby. "The situation is picturesque, and would be more so had a little of the timber been left standing on the hills. Here, however, the universal Canadian practice has been followed in clearing the land, that of sweeping away everything capable of bearing a green leaf; although it requires a generation to repair the devastations of a few hours. The new settler, however, looks upon trees as enemies, which must be destroyed on any terms, and it is not until he has been settled for some years, and begins to feel comfortable, that he wishes he had left a few trees to ornament his domain." As evidence of the quantity of timber being taken out at this time (1851), he states that twenty one sawmills were in operation within the township. Lumbering is still-carried on to some extent, winter cutting being done in the large swamp of the Holland river valley and on the hills to the south. The last stationary sawmill in York county is located near Pottageville. Much of the hilly land which was stripped of its timber is unsuited for cultivation and is still barren.

The absence of the forest prohibits an accurate estimate of the associations and relative abundance of the various trees as they occurred

naturally. One curious result of lumbering operations is that white pine is now rarely found outside of the swamp. These relics were preserved as a result of their inaccessible situations. The individual trees may be seen rooted in some slight mound above their water-soaked surroundings, clinging, as it were, to the only semblance of their normal habitat. The following is an estimate of conditions as they are to-day.

The forest is largely characterized by the same species of trees as in earlier times but is confined to the rough, untillable hills and low, wet land. On the hiily ridges sugar maple predominates over a mixture of beech, yellow birch, hemlock, American elm, paper birch, basswood, white ash, black cherry, large-toothed aspen and hop hornbeam. On the flatter ground a similar association is found but with hemlock frequently replacing sugar maple as the dominant tree, and a few other trees being present, including red maple and aspen poplar. On the low ground and in the swamps proper, white cedar, balsam poplar, red maple, slippery elm, black ash, tamarack, balsam fir and black spruce are established. Some of these, such as white cedar and tamarack, occur rather extensively in pure stands in suitable situations. Locally, willows and oaks, cork elm, white spruce, butternut, etc., are to be found, but they do not comprise a substantial element of the forest.

The climate of King township is very similar to that of Toronto as regards precipitation and temperatures, although some minor differences may be noted. These are due to the higher elevation and the fact that the area is somewhat removed from the influence of Lake Ontario. Snow sometimes falls there while the same precipitation is reduced to a cold rain in the city, as attested by several local naturalists who make frequent visits to the region by rapid transit. Snow also persists in the swamps after it has entirely disappeared at Toronto. The insulation of the swamp is particularly noticeable, ice being found under moss in the tamarack swamps as late as the third week in June during some years. The characteristic winter cloud-blanket which enshrouds the city is often left behind when one travels north as far as King township. These factors contribute to the minor differences which exist between the climates of King township and the city of Toronto.

The population of King township in 1921 was 5,149, over 93 per cent. being of British origin. This population is scattered and concerned largely with agriculture. Of the eleven towns and villages which are completely within the boundaries of the township, Schomberg is the largest with a population of about 300. Until June 20, 1927, it was the terminus of an electric railway from Yonge street but this branch was discontinued on the above date. A branch of the Canadian National railway cuts the southeast corner of the township and also a small section in the northeastern corner.

A recent agricultural development which will affect the biota of a portion of the Holland river valley is the drainage of 7,265 acres of flat, marshy land (Day, 1927). By digging a canal around this area and dyking the inner side with earth, the outside swamp water is prevented from entering the enclosed area. The section of the old river-bed passing through the centre now serves as a reservoir for precipitation on the reclaimed land and the water collecting there is pumped out.

Previous work

We are indebted to Mr. J. L. Baillie for reference (1874) to an early account of a "side hunt" which, although it did not take place within the township, occurred at its border near the town of Bradford (W. Gwillimbury township). The article states that ". . . A shooting expedition organized at Bradford, Canada, last week consisted of two parties, with fifteen men in each. One returned with 3 foxes, 2 rabbits, 10 partridges, 1 hawk, 43 black squirrels, 5 woodpeckers, and 41 red squirrels, and the other with 8 grey squirrels, 4 partridges, 1 pigeon, 70 black squirrels, 4 blackbirds, 11 woodpeckers, 60 red squirrels . . . . ."

The next earliest accounts which concern the natural history of King township or immediate territory are two articles on birds, titled *Holland River Notes* (Thurston and others, 1892, and Atkinson, 1892). From the texts it appears that these observations were made along the east branch of the Holland river which lies just outside of the eastern boundary at the north. A few specific records of birds have been made by Fleming and Lloyd (1920) and Lindsay (1929). The only published account of mammals is by Edmonds (1928), dealing with the contents of the stomach of a fox.

King township is included in a general way in *The Natural History of the Toronto Region, Ontario, Canada* (Faull, 1913, editor) but is not referred to specifically. Considerable botanical work has been done there but to our knowledge nothing has been published.

Life Zone and Faunal Area

It will be noted in the following lists that the animals recorded from King township are a mixture of northern and southern species—species with wide ranges which overlap in this area from contiguous zones. Such a fauna, in the wooded section of eastern North America, is a part of what has been termed the Alleghanian fauna of the Transition life zone. This fauna is perhaps more difficult to characterize by a few specific indicators than is that of other zones.

Among the mammals the geographic form of the woodchuck, *Marmota monax rufescens* and of the flying squirrel, *Glaucomys sabrinus*

macrotis, may be considered as characteristically Alleghanian. Among the birds two species which have been considered as typical of this zone by other authors, a view with which we concur, are the black-billed cuckoo (*Coccyzus erythrophthalmus*) and the wood thrush (*Hylocichla mustelina*).

Of more significance in regard to the transitional character of the fauna of King township was our finding of the following species in close proximity,—cottontail (*Sylvilagus floridanus*) and porcupine (*Erethizon dorsatum*), indigo bunting (*Passerina cyanea*) and white-throated sparrow (*Zonotrichia albicollis*), cerulean warbler (*Dendroica cerulea*) and myrtle warbler (*Dendroica coronata*), towhee (*Pipilo erythrophthalmus*) and Lincoln's sparrow (*Melospiza lincolni*), crested flycatcher (*Myiarchus crinitus*) and olive-sided flycatcher (*Nuttallornis borealis*).

All the amphibians and reptiles secured are wide-ranging species but the overlapping of the tree toad (*Hyla versicolor*) which is characteristically southern, and the mink frog (*Rana septentrionalis*), a species typically northern, is worthy of mention.

The forest as described in the general introduction is of the mixed composition characteristic of the Transition zone. The needle-leaved, northern types are confined to the low swampy areas, where conditions approach the boreal. The broad-leaved, southern types occupy the drier glacial drift. As with the animals, species more characteristic of adjoining northern and southern zones here overlap geographically. Black spruce (*Picea mariana*) and dwarf birch (*Betula glandulosa*) may be only a stone's throw from staghorn sumac (*Rhus typhina*) and climbing bittersweet (*Celastrus scandens*).

Acknowledgements

In March, 1925, the "Kettleby Kabin Klub" was formed and in April of that year established a camp near Pottageville, one of the primary purposes being to study the local biota. Since that time the members, Messrs. J. L. Baillie, H. H. Brown, J. H. Fleming, W. P. Young and the writers have had opportunity to observe intermittently the principal features of the country and its wild life. To the other members of the club, the Museum and the writers are indebted for contributions to the work in hand and especially for the full use of the camp and equipment for the Museum's party during the summer of 1926. Special acknowledgment is due Mr. Baillie, who was also associated with the writers in field-work as a member of the Museum staff.

Other local naturalists have co-operated in many ways and individual acknowledgment is made in the text. Our thanks are due to Mr. J. A. Lloyd, on whose property the camp was established and who ren-

dered every assistance and accommodation possible. Appreciation is also here expressed to Mr. and Mrs. Alfred Merriman, the late Mr. William Meale, Mr. George Meale and Mr. Fred Blackburn and other local residents for favours and considerations given to the members of the club since its inception.

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A FAUNAL INVESTIGATION OF KING TOWNSHIP, YORK COUNTY, ONTARIO

II. THE MAMMALS OF KING TOWNSHIP

By L. L. Snyder

Sections of King township, especially the swamp along the Holland river, have afforded protection to several species of mammals which have become extirpated in most other areas equally adjacent to Toronto. Several species formerly found within the township boundaries no longer occur although they are still remembered by the older residents of the district. At one time the beaver dammed the creeks of the lowland and to-day some areas are referred to by residents as "beaver meadows." No remnant dams or other definite signs of beaver, however, have been located by us. The black bear has been extirpated for some years, the last one being shot by Charles Burden near the present site of Kettleby Kabin about the year 1888, although an exact date could not be ascertained. This was said to be "in the berry season," probably July or August. A specimen of the lynx was killed west of Aurora about the winter of 1883 by John Hogan and was for a long time exhibited in the hotel in the town of King. The description given by two of the older residents makes it appear fairly certain that the species was *Lynx canadensis*. No records of the bay lynx, *Lynx rufus*, have been secured although it appears probable that this species formerly lived within the area and may have been more numerous than *Lynx canadensis*. Other fur-bearers must have originally occurred in the township but no records or first-hand information have come to light excepting those which appear in the following list. It is also probable that future collecting in the township will reveal the presence of small mammals other than those listed below. The variety of habitats which occur in the township strengthens the probability of such additions. *Clethrionomys gapperi gapperi*, the red-backed mouse, was described from specimens taken from this general region but as yet it has not been trapped by us.

The following list is based on a collection of 99 specimens secured by a number of individuals, mostly by members of the Museum's staff, and on the observations made at intervals by several Toronto naturalists over the past six years (since May, 1924), but expecially during the summer of 1926.

Specimens of *Sorex fumeus fumeus*, *Mustela cicognanii*, *Mephitis mephitis nigra*, *Glaucomys sabrinus macrotis*, *Peromyscus maniculatus bairdii*, and *Lepus americanus virginianus*, have been submitted to the Bureau of Biological Survey, Washington, D.C., for determination. The measurements given are in millimeters unless otherwise stated and were taken from specimens in the flesh. The total length is indicated by L., the tail vertebrae by T., and the hind foot by H.F.

Condylura cristata (Linn.). STAR-NOSED MOLE.—We repeatedly looked for signs of this mole in the black earth of damp swales, but without success. It is, however, found in such situations as attested by remarks made by Mr. J. A. Lloyd, who has "occasionally" seen moles with a peculiar "fringe on their noses." In the month of May, 1923, while repairing a road in a wet area near the swamp, he plowed up a nest containing several young of these animals. The nest was in a slight mound in the ground. Two badly decomposed specimens were taken from a sunken box in a spring hole on the hillside back of Cedardale mill. The skull of one of these taken on October 3, 1926, is preserved in the Museum's collection.

Sorex cinereus cinereus Kerr. CINEREOUS SHREW.—This species is probably common but because of its small size and general inconspicuousness due to habits, little has been learned about it. On May 10, 1925, several members of the Kettleby Kabin Klub, including the writer, were seated before their camp when their attention was attracted to one of these tiny beasts. Some forty feet away a fallen log approximately thirty feet long and two feet in diameter lay along the ground, somewhat imbedded in the loose surface layer of decaying vegetation. The wind was blowing briskly, disturbing the fallen leaves which filled the depressions and leeward spots. One observer noticed a peculiar eddying of a leaf from the ground to the top of the log and not until such a movement was repeated several times did he become aware that this was not an accidental disturbance by the wind but a leaf being transported by some animal. The attention of the others was directed to the spot and with the aid of binoculars a small shrew, probably the cinereous shrew, was seen running to the ground. It picked up a leaf and in an instant returned up the side of the log, reversed itself, and pulled the leaf into a hole after it. The shrew was allowed to make several trips before being disturbed, at which time we found it had entered the somewhat rotten log through a hole no larger than one's finger. The spot was marked with the intention of examining the nest and its respective chamber, but when this was attempted some time later the channel to the nest could not be traced far but it was found to reach fairly solid wood before it became obscure. There seems little doubt that this individual was preparing a nest. On occasions specimens of this shrew have been picked

up dead, and although they were too old to preserve, the bodies appeared uninjured. An explanation of this has been suggested by Jackson (1928). He accounts for this as being the result of some nervous shock or as the result of the extreme sensitivity of shrews to physical forces. Starvation may also be a cause of fatality if an individual becomes lost from its accustomed runways. Two individuals were secured by trapping, the average measurements being, L., 91.5; T., 37; H.F., 11.5.

Sorex fumeus fumeus Miller. Smoky Shrew.—One specimen was secured in long grass at the edge of a small swamp near our camp by Mr. J. L. Baillie, on August 22, 1928. This situation and other similar ones had been repeatedly trapped previous to this capture, but unsuccessfully. The smoky shrew has not previously been taken in the Toronto region. The measurements of this specimen are, L., 110; T. 42; H.F. 13.

Blarina brevicauda talpoides (Gapper). Mole Shrew.—This was a fairly common species, found in wet or dry situations in or near woods. On two occasions specimens were captured in our camp buildings, once in December and again in March. These no doubt gained entrance from the unfrozen ground beneath the building. The species wanders during the daytime (in summer), one individual having been captured alive from the surface of the ground in a dry woods. A specimen was found dead in April near Cedardale mill (see remarks in this connection under cinereous shrew). Of the seven specimens preserved, the average measurements are, L. 117.4; T. 23; H.F. 15.3.

Myotis lucifugus lucifugus (LeConte). Little Brown Bat.—No record of this species was made until September 2, 1929, when two specimens were secured. Mr. H. P. Stovell collected these during the daytime from beneath the slab-siding of the woodhouse of the Kettleby Kabin Klub. One of these is preserved in the Museum's collection.

Eptesicus fuscus fuscus (Beauvois). Big Brown Bat.—A male specimen was taken at 8.35 p.m. on July 29, 1926. Other bats which were probably of this species were seen flying about the clearings at camp at dusk during the same summer but none could be secured.

Lasionycteris noctivagans (LeConte). Silver-haired Bat.—A female was shot by Mr. Baillie at 8.10 p.m. on August 3, 1926, while it was flying about just over the treetops in open woods near our camp. No others were secured.

Procyon lotor lotor (Linn.). Raccoon.—Raccoons are secured regularly each winter by local trappers in and about the swamp of the Holland river. Their tracks may be noted along the banks of the numerous streams which meander through the woods. On May 17, 1925, a specimen was found asleep during the daytime in an old squirrel's nest some thirty-five feet from the ground in dense, wet woods. Although

the species will probably persist for some time in this extensive swamp, it is threatened by the practice of trappers of cutting down "coon trees" in which the animals are denned up. Large, hollow trees suited to their needs are getting rather scarce. No specimens have been collected by us.

Mustela cicognanii cicognanii Bonaparte. BONAPARTE WEASEL. —Mr. Paul Hahn has presented to the Museum a skin of this species taken in February, 1927, on the hillside bordering the Holland river swamp near our camp. No measurements except from the skin were secured but the specimen is a very small individual and has been determined as *M. c. cicognanii* by Dr. H. H. T. Jackson. This is the first record of the species for the Toronto region.

Mustela noveboracensis noveboracensis (Emmons). NEW YORK WEASEL.—A fine large male specimen was secured on June 12, 1926, in thick mixed woods near Pottageville. It was hunting the ground about and under logs and did not appear particularly alarmed at the writer's approach. Another specimen, a nursing female in the collection of Mr. Stuart L. Thompson, was collected by him at Kelly lake on May 24, 1925. Weasel tracks are frequently seen in the swamp in winter and on one occasion the writer saw signs of a successful capture of a mouse by one of these lithe predators. The male specimen measured, L. 399; T. 144; H.F. 50, approximately the terminal half of the tail being black. The female was not measured while in the flesh but the tail of the dried specimen measured $3\frac{1}{2}$ inches from the body to the tip, not including the hair. The black area of the tail includes approximately the terminal one-third.

Mustela vison vison Schreber. MINK.—Local trappers secure a few mink each winter in the swamps and along the creeks, but they are no longer plentiful. Two were seen by us on August 1, 1926, at Mount Melick millpond near Strange.

Mephitis mephitis nigra (Peale and Beauvois). SKUNK.—The skunk of the Toronto region has previously been recorded (Fleming, 1913) under the name *Mephitis mephitica mephitica* but is now recognized as *M. m. nigra*, the form which probably inhabits all of southern Ontario. The name *M. m. mephitis* is now applied to the skunk of northern Ontario. Although Howell (1901) considered the differences between *mephitis* (=*Chincha mephitis*) and *nigra* (=*Chincha putida*) of specific value at the time he published his revision of the skunks which has been followed extensively by other writers, he now is inclined to include all of the skunks of eastern North America under one specific name.

Skunks are still not uncommon and may be met with in the farmed areas as well as in the wooded sections. Their leisurely gait and night-wandering habits subject them to new dangers along the highways although a thoughtful motorist will attempt to avoid contact with such

highly protected beasts. A female specimen trapped near our camp on June 22, 1926, has two white stripes which diverge from the white area of the upper neck and extend only slightly beyond the shoulders. The measurements of this specimen are typical for the long-tailed *nigra* and are as follows, L. 22½ inches; T. 9 inches; H.F. 2 5/8 inches.

Vulpes fulva (Desmarest). Red Fox.—A few foxes are trapped each winter by farm boys and trappers of the district. The forested hills are eminently suited to these animals, making it probable that they will persist in the township for many years. A specimen collected on January 8, 1928, is now mounted in the Museum and has been recorded by Edmonds (1928) in connection with stomach analyses. In the late afternoon of May 8, 1927, Messrs. W. J. LeRay and E. B. S. Logier watched one hunting and catching mice in the grass near Kelly lake. It apparently caught several, placing them in a pile as each was caught. They were all picked up and carried away together. The specimen collected, a male, measured, L. 39¾ inches; T. 14½ inches.

Marmota monax rufescens Howell. Woodchuck.—The woodchuck of King township and southern Ontario generally belongs to the form *rufescens* described by Howell (1914). It has previously been listed in connection with the mammals of the Toronto region as belonging to the type form *monax*. It is a common mammal in this area, inhabiting the higher ground both in the clearings and in the woods. They are somewhat troublesome in some places where they encroach upon cultivated land but due to local control they are most numerous where the soil is poor and uneven. On the grounds of the Kettleby Kabin Klub one large individual made his burrow in a small clearing under the root of a large pine stump. It regularly used this stump as a lookout and could frequently be observed sunning itself there. The burrow was, as mentioned, beneath the root of a stump, which appears to be the usual location for the entrance to the burrow of this species. This, no doubt, gives protection against destruction of the entrance by dogs which attempt to dig them out. Several examples of a back exit from the burrow have been noted. In each case no pile of earth marked the opening, the digging having been accomplished from the inside, the earth being carried to the main entrance or elsewhere. The writer has observed a woodchuck up a tree on two occasions; on the first, the animal was taken by surprise by my dog and climbed a hemlock going out to the tip of a branch some twenty feet from the ground; on the second occasion no such alarm prompted the act, the animal first being observed from a considerable distance, ten feet up in a pin cherry tree, which was no doubt serving as a lookout. On approach the animal scrambled down and into its burrow. The average measurements of two adult males are, L. 21 1/8 inches; T. 5 1/8 inches; H.F. 3 1/8 inches.

Tamias striatus lysteri (Richardson). EASTERN CHIPMUNK.—A common inhabitant of the wooded sections. This species is not strictly terrestrial in its habits as one individual repeatedly gained entrance to our cabin by climbing to the roof and entering between the rafters. Of the nine unmutilated adults preserved, the average measurements are, L. 236.3; T. 93.7; H.F. 34.

Sciurus hudsonicus loquax Bangs. RED SQUIRREL.—The red squirrel has not been very common any year within the experience of the naturalists visiting the region since 1924, but a few are always noted during any extended walk through the wooded sections. Mr. J. A. Lloyd related to the writer that woodsmen of the district used to locate wild bee stores in early winter by following the tracks of red squirrels, their well-marked path to and from a bee tree suggesting their fondness for honey. The average measurements of eleven undamaged adults are, L. 298.4; T. 117.8; H.F. 45.7.

Sciurus carolinensis leucotis (Gapper). BLACK OR GRAY SQUIRREL.—King township is near the centre of the type locality of this form. Dr. Anthony Gapper described the grey phase as a species (1830), naming it *Sciurus leucotis*. At that time the gray squirrel was considered rare and present conditions are similar, the black phase outnumbering the grey by perhaps ten to one. These squirrels found in the woods of King township are wary and have not the confidence in man that has been acquired by the individuals of Toronto city parks and streets. The average measurements of six adults are, L. 474.3; T. 217.8; H. F. 63.5.

Glaucomys sabrinus macrotis (Mearns). NORTHERN FLYING SQUIRREL.—This was an interesting addition to the fauna of the Toronto region. *G. v. volans* occurs sparingly at Toronto, but *G. s. macrotis*, a southern form of the northern flying squirrel, had not previously been discovered in the region. It inhabits the extensive woods of the Holland river swamp and although it is an animal rarely seen we have been particularly fortunate in securing three adult specimens (skins). In addition two young taken June 4, 1926, are preserved in alcohol. The method practised in discovering these animals was by jarring the base of dead stubs which contained woodpecker holes. In one instance one of these squirrels was disturbed from a flicker box on the property of the Kettleby Kabin Klub. The first specimen was discovered on May 25, 1925, by Dr. Paul Harrington and Mr. Baillie. The average measurements of the three specimens are, L. 276.3; T. 113.3; H.F. 36.

Peromyscus maniculatus bairdii (Hoy and Kennicott). BAIRD WHITE-FOOTED MOUSE.—The first capture of this mouse in the Toronto region was made on February 2, 1924 (Snyder, 1925), the extension of its range eastward in Ontario having been previously predicted, since the

species had the lakeshore and cultivated territory to spread over. The appearance of the species in King township, however, is more surprising since it indicates that this mouse is distributed northward and inland for more than thirty miles from the lake in the Toronto region. On November 23, 1925, two specimens were secured in long grass on the edge of an unused road near the swamp of the Holland river. One of these is just acquiring the coat of maturity; the other is an adult. A third specimen was taken beside a fence bordering open fields near Kelly lake. Measurements of the only adult measured are, L. 130; T. 47; H.F. 18.

Peromyscus leucopus noveboracensis (Fischer). White-footed Mouse.—This was the common white-footed mouse of the wooded sections. It was a regular visitor about our camp building, particularly so in the autumn. On June 2, 1926, a nest with six suckling young was found in a rotten foundation timber beneath a small frame building. It also frequently builds winter nests about our buildings, on the sills, etc., using any soft materials that are available about camp. The average measurements of nine adults are, L. 169.6; T. 80; H.F. 20.3.

Microtus pennsylvanicus pennsylvanicus (Ord.). Meadow Mouse.—During some years this species is undoubtedly common, but our observations in the township since 1925 have shown it to be surprisingly rare. Only one specimen was trapped during the summer of 1926. The average measurements of two adults are, L. 150.5; T. 38; H.F. 19.

Ondatra zibethica zibethica (Linn.). Muskrat.—In spite of regular trapping these animals persist about the small ponds near farmland, although no area is thickly populated with muskrats. When their numbers increase so that the animals become conspicuous, their ranks are speedily decimated during the following open season. Only on one small pond have their houses been found by us. It appears that the scattered individuals live mostly in burrows. No specimens have been collected.

Rattus norvegicus (Erxleben). House Rat.—The rat is to be expected about farm-buildings everywhere. Especially is it a menace to chicken-raisers where it damages grain and grain bags. The only specimen preserved was taken in such a situation.

Mus musculus musculus Linn. House Mouse.—Generally distributed, occurring principally about farmsteads, although the species wanders, especially in the fall, and has been captured at this season in our camp buildings situated in the woods.

Zapus hudsonius hudsonius (Zimmermann). Meadow Jumping Mouse.—Found to be fairly common since 1925. Most of the specimens which have been seen or collected were in long grass or beneath brush

near wet cedar swamps. On the morning of July 15, 1928, Mr. W. J. LeRay found a nest beneath a rail in a weedy fence corner in an open section some distance from woods near a small pond. The adult left the nest with a bound and although the rail was returned to its original position the parent had not returned shortly before dark. The nest, made of dry grass, and the six young were taken. The young were old enough to be covered with hair and were kept alive for two weeks before being preserved. The average measurements of four adults are, L. 200.2; T. 119; H.F. 28.7.

Erethizon dorsatum dorsatum (Linn.). PORCUPINE.—One of the interesting additions to the mammals of the Toronto region. The great extent of wooded swamp of the Holland river accounts for the existence of this species at the present date. Unfortunately the animal is enough of a curiosity to endanger it when seen by the casual hunter. There can be no charge against it since the territory it inhabits is practically useless and a few individuals will probably escape the thoughtless destroyer for many years. A young specimen was collected by Mr. Baillie in a dense growth of young deciduous trees near the edge of the swamp on May 25, 1925. We have record of two adults being shot on October 11, 1924, but we could not secure the specimens. The measurements of an adult collected on December 27, 1929 are, L. 720; T. 199; H.F. 100.

Lepus americanus virginianus (Harlan). VARYING HARE.—These animals exist mainly in the depths of the extensive swamp of the Holland river and have only occasionally been noted by us on its margin. In winter their big foot-tracks may be followed in and out of the labyrinth of fallen timber and occasionally a hare may be started by day but for the most part they are active at night. A few hunters find sport in hunting these hares with dogs. One specimen was snared by the writer at the entrance of a burrow beneath a brush-pile in the depths of the swamp. It could not be determined what kind of animal had made the burrow or whether it was a natural or accidental hole leading into the ground but it was established that the hare will resort to underground protection during the daytime when the opportunity is afforded. Little has been learned as to the fluctuation in numbers of this animal in the township, but it was certainly more numerous during the winter of 1929-30 than previously. The average measurements of five winter adults are, L. 474; T. 50.8; H.F. 137.

Lepus europaeus europaeus Pallas. EUROPEAN HARE.—This hare, which was introduced at Brantford, Ontario, in 1912 (Dymond, 1922) first reached King township in mid-February, 1925, according to our records. Mr. Silas Groombridge states that he shot a hare in an open field at that time and his description could apply only to this species.

The animal came into the township from the Woodbridge district according to Mr. R. J. Rogers, Agricultural Representative for York county, and was considered by him to be quite numerous in King township, in December, 1927. Our only specimen is a male taken on October 6, 1929. The measurements were as follows, L. 655; T. 88; H.F. 155.

Sylvilagus floridanus mearnsii (Allen). Cottontail.—Known to have been fairly common during the winter of 1925-26 and during the following summer. Considered less numerous during the year 1928. The species inhabits the smaller swamps as well as thickets in dry, unused land. It seldom invades the big swamp where it would overlap the territory of the varying hare. The average measurements of two adults collected are, L. 443.5; T. 60 (one specimen); H.F. 100.

Odocoileus virginianus borealis (Miller). White-tailed Deer. —It has been some years since deer were permanent residents of the township. Occasionally a stray individual or two may appear in the northern part of the area in winter where the swamp affords them protection and the woods are almost continuously linked with the north where deer occur regularly. Two were seen during the winter of 1925-26, and another one wintered in the swamp two years later (1927-28). In both instances the animals were seen by local residents and their tracks were noted in the snow as late as April 22, 1928, by us. In 1929-30 at least three deer were again noted.

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A FAUNAL INVESTIGATION OF KING TOWNSHIP, YORK COUNTY, ONTARIO

III. THE SUMMER BIRDS OF KING TOWNSHIP

By L. L. Snyder

The avifauna of the Toronto region is perhaps as well known as that of any similar region in the province and it might therefore have been deemed unnecessary to make a survey such as the one here reported. However, work entirely confined to the summer season has never been prosecuted systematically within the area and the particular section with which we are here concerned, King township, has not received especial attention although it exhibits conditions not to be found extensively elsewhere in the region.

The outstanding feature of King township from the ecological viewpoint is the presence of an extensive swamp which in some parts approaches rather typical bog conditions. Such situations create what have been termed "boreal islands." It is probably due to the somewhat cooler temperatures which prevail in the swamp and bog as compared with the surrounding area that certain species of plants and animals, the numerical centre of abundance of which is farther north, find this area a more or less suitable habitat. As a consequence we have been able to make some additions to the list of birds known to reside in summer within a thirty-mile radius of Toronto.

With few exceptions the occurrence of the various species of summer birds presented in the following paper was recorded during June, July, and early August, 1926, when a party from the Royal Ontario Museum of Zoology was stationed near the village of Pottageville. A few observations had been made in the summer of 1925 and some additions resulted from visits there during August of 1927 and 1928. The list is believed to be fairly complete although it is to be expected that future work will add at least a few species.

Daily lists of the species seen were kept throughout the summer of 1926, more than fifty being noted regularly, while twice in midsummer seventy species were listed. All species seen within the summer months, June, July and August, are included in the following list, the status of each being remarked on in the text. Although the woodcock, ring-necked pheasant and pine siskin have not been positively identified in

the township in summer they have been included for reasons stated under the specific accounts. All dates given in the text refer to 1926 unless otherwise stated.

Annotated List

The following list comprises 112 species. At the end of the discussion of each species, a list is given of the specimens of that species collected. The total number of specimens thus recorded is 213. Young of the year are indicated as "Yg.," while specimens known to be in their second year are indicated by "Im."

The arrangement of the list is according to the 1910 edition of the American Ornithologists' Union Check List and the nomenclature is that of the same edition with changes that have appeared in the published supplements.

Larus argentatus. HERRING GULL.—From one to twelve of these birds were seen daily during the summer as they flew overhead on their course between Lake Ontario and Lake Simcoe. As many as thirty-one passed over on the evening of July 17. All of those noted at fair range appeared to be adult or nearly adult birds. Apparently these are non-breeding birds which summer in this region (see Fleming, 1930). The single specimen secured is in full adult plumage.

♀ June 20.

Querquedula discors. BLUE-WINGED TEAL.—A young male was taken on a small pond on August 21, 1928, by Mr. W. J. LeRay. It has not been ascertained whether or not the species nests within the township but it can be safely said that it is of rare occurrence in the area.

Yg. ♂ Aug. 21, 1928.

Aix sponsa. WOOD DUCK.—A female was seen on a small lake surrounded by flooded green timber on August 22, 1928, by Mr. J. L. Baillie. Such a situation would probably be suitable for the species to nest in but no evidence that it does so has been secured.

Botaurus lentiginosus. BITTERN.—One regularly visited a creek near our camp during the summer and others were noted elsewhere. A few pairs probably breed in the wet margin of the Holland river but we have found no nests.

? August 6.

Ardea herodias herodias. GREAT BLUE HERON.—Individual birds were seen at dusk periodically throughout the summer and three were noted at this time of day on July 17. These birds are probably wanderers from breeding colonies located on Thorah island, Lake Simcoe (35 miles to the northeast) or in the Minesing swamp, Simcoe county (30 miles to the northwest).

Butorides virescens virescens. Green Heron.—Two or three of these birds would be noted on days on which we penetrated the flooded alder thickets of the swamp where big trees had been removed. They were also noted along the meandering course of the upper section of the Holland river. These situations were ideal for the species to nest in but no nests were found.

♀ June 24.

Nycticorax nycticorax naevius. Black-crowned Night Heron.—One of these birds was seen by Mr. Baillie and the writer on June 29 as it flew along the tree-draped border of the upper Holland river. A specimen was also seen just outside the township boundary near Bradford by Dr. F. A. E. Starr on June 22, 1921. These birds were both adults and although their occurrence was noted in midsummer the species can only be considered as an occasional summer resident, no evidence that it nests having been discovered.

Rallus virginianus. Virginia Rail.—Noted on two occasions, once in a small patch of rushes and once in a wet thicket of alders. These were similar situations, both being clearings within the wooded swamp. The species no doubt nests in such situations, the specimen collected containing fairly well-developed eggs.

♀ June 15.

Porzana carolina. Sora.—Seen on four occasions during the summer. It frequents the tall grass bordering the Holland river and along the marshy shores of some of the small ponds and lakes which are denuded of trees. The young bird collected, though fully feathered, was no doubt reared in the immediate vicinity.

Yg. ♀ August 6

Rubicola minor. Woodcock.—During early May, 1928, Mr. Stuart Thompson observed this species performing its nuptial flight, and also on May 19 of the same year, Mr. Baillie and other members of the Brodie Club saw and heard the same performance. This would indicate that a few birds may nest along the extensive swamp in the northern part of the township. However, only one observation was made during the entire summer of 1926, which indicated that the bird was a summer resident. While hunting for bats on the evening of June 26, the writer saw a bird flying swiftly and directly, perhaps ten feet from the ground, toward a creek some yards away. The momentary impression which I got as the bird passed me in the small clearing was that the flight and form was that of a woodcock and I have no doubt that such was the case.

Gallinago delicata. Wilson's Snipe.—Each spring, about the end of April, this species has been observed performing its nuptial flight over the wet clearings and woods near our camp. The birds appear at daybreak on some mornings but more especially at dusk in the evening,

making wide, irregular circuits in the sky and producing their characteristic notes which may be described as a regularly interrupted monotone, a vibrato or winnowing on one pitch. Very few have been noted during the summer months but it appears probable that a few pairs may nest on the extensive flat-lands which border the Holland river.

♂ July 4.

Pisobia minutilla. LEAST SANDPIPER.—This species is included in the list because it occurs in the township as a migrant during summer months. It is likely to be found about temporary ponds in cultivated fields.

Yg. ♀ August 22, 1928.

Totanus flavipes. YELLOW-LEGS.—Another migrant which occurs in summer months. The specimen collected was taken on the border of a small temporary pond in a cultivated field.

Yg. ♂ August 22, 1928.

Tringa solitaria solitaria. SOLITARY SANDPIPER.—Also a migrant which occurs during the months of July and August. It is to be found occasionally about the borders of temporary ponds and small permanent lakes.

♀ July 28. Yg. ♀ August 21, 1928.
" ♂ August 22, 1928.

Actitis macularia. SPOTTED SANDPIPER.—A common summer resident in all sections where suitable habitats are to be found. A pair hatched a brood of four young in the trench which borders the railroad right-of-way near our camp.

Yg. ? July 18. ♀ June 9.

Oxyechus vociferus. KILLDEER.—A summer resident, fairly generally distributed in pastured areas. A female collected in mid-June contained partially developed eggs. Its plumage is very much worn as is characteristic of breeding birds, but the feathers of the back are distinctly margined with rusty, a condition of immaturity.

♀ June 15.

Bonasa umbellus togata. CANADA RUFFED GROUSE.—The grouse of this region have been referred to *togata* by Fleming (1907). A winter female from King township is very similar to females from southern Ontario generally. It is, however, somewhat redder than any specimen from northern Ontario which we have in the Museum collection. Birds from Lake Nipigon (Snyder, 1928a) are noticeably grayer, while those from Lake Abitibi (Snyder, 1928b) are blacker.

Not many grouse persist within King township and their numbers are known to have been reduced within the past three or four years. In 1925 and 1926 they were frequently seen and males could be heard drumming during the day and even at midnight during the spring of

both years. Their reduction may be entirely due to hunting, irrespective of the prohibitive regulations which have prevailed since the fall of 1927. Local naturalists have refrained from securing desirable specimens in order to give these birds a better chance to increase.

The species nests in the heavier woods bordering the swamp, both eggs (ten incubated, May 25, 1925) and young being observed.

Yg. ? June 28.

Phasianus torquatus. Ring-necked Pheasant.—A farmer living in the northern part of the township hatched and liberated about twenty of these birds a year or two prior to 1926. Some of these may still survive as they had done so up to a short time prior to our summer's stay. Individual specimens had been seen by us on two occasions. It seems improbable, in view of the known introduction, that birds observed are from the stock which is now well established throughout parts of extreme southern Ontario.

Zenaidura macroura carolinensis. Mourning Dove.—Generally distributed and not uncommon. A pair nested in a paper birch near our camp and other nests have been found..

♂ July 3.

Circus hudsonius. Marsh Hawk.—Seen fairly regularly throughout the summer. A young bird which as yet had not attained its full powers of flight was secured from the border of the tamarack bog which flanks the wet grassy flat-land of the Holland river. A nest with five eggs was found on May 19, 1929.

Yg. ♂ July 26.

Accipiter velox. Sharp-shinned Hawk.—An adult male was collected in open woods in mid-June, this being the only summer occurrence of which we have record.

♂ June 18.

Accipiter cooperi. Cooper's Hawk.—The species may be considered a rare summer resident of the township and we have but one record for the species in the summer months—June 14, 1925. However, it is a breeding bird of the area, a nest containing four fresh eggs having been found by Mr. Stuart L. Thompson on May 5, 1929.

Buteo borealis borealis. Red-tailed Hawk.—Not more than two individuals were seen on any one day during the summer, but an adult, probably the same one, was noted regularly in one situation. No recently used nests were found but one which appeared to belong to either this species or the next was located in a heavily-wooded section of the swamp. On July 15, Mr. Baillie saw an adult carry food to a flying young bird which had but recently left the nest.

Buteo lineatus lineatus. Red-shouldered Hawk.—What was presumed to be the same bird was seen on several occasions in a section

of the woods bordering the swamp. Like most of the hawks listed from the township, this species can only be considered as rare.

Cerchneis sparveria sparveria. SPARROW HAWK.—Rarely seen. The only nesting pair was found on our first visit to the region on May 25, 1924.

Asio wilsonianus. LONG-EARED OWL.—Although this owl had been found nesting near Bradford just beyond the borders of King township by Dr. Paul Harrington and Dr. Fred Starr on May 23, 1920, we had no records of its occurrence within the township until August 20, 1928, when one was secured.

♀ August 20, 1928.

Otus asio asio. SCREECH OWL.—This owl was heard on a number of occasions near our camp but little is known of its abundance in the township as a whole. On the evening of June 16, we discovered a brood of flying young with a parent bird. The brood was no doubt reared close by.

♀ June 12. Yg. ♂ June 16.

Bubo virginianus virginianus. GREAT HORNED OWL.—A pair has returned to nest in a paper birch tree, situated in a dense wet woods bordering the swamp, each year since 1924, at least until 1927. This nest contained two eggs on March 7, 1925. Another occupied nest was found within the swamp, about fifty feet from the ground, in a hemlock tree, in the spring of 1927. It is impossible to estimate accurately the abundance of this species but other pairs are probably established in heavily wooded sections, particularly in the extensive swamp.

Coccyzus americanus. YELLOW-BILLED CUCKOO.—One was seen on June 14, 1925, by Messrs. H. H. Brown, R. V. Lindsay and C. D. Richards. This is the only occasion on which the species has been reported within the township.

Coccyzus erythrophthalmus. BLACK-BILLED CUCKOO.—Seen regularly throughout the summer and is apparently generally distributed. A nest with three fresh eggs was found by Dr. Harrington on June 19. It was situated about three feet from the ground in a red-ozier dogwood.

♂ June 24.

Ceryle alcyon alcyon. BELTED KINGFISHER.—Generally distributed but not common. Nesting tunnels were found beside the railway right-of-way at some distance from water.

♂ June 29.

Dryobates villosus villosus. HAIRY WOODPECKER.—The form found resident in the township is *villosus*. The species is not common but was noted regularly. An occupied nesting hole containing young was found on May 31, and others were found during the summer.

Yg. ♂ June 16. Yg. ♀ July 30.
Yg ♀ July 2. Yg. ♂ August 3.

Dryobates pubescens medianus. Downy Woodpecker.—This species nests commonly in the area. Several nesting cavities, old and new, were found, at low elevations. Such a cavity, undoubtedly made by a downy woodpecker but occupied by a house wren, was only two feet from the ground. Dead birch, in which drilling would be comparatively easy, was frequently used, but, on the other hand, dead maple in fairly sound condition was also used.

♂ June 19. Yg. ♂ August 17.

Sphyrapicus varius varius. Yellow-bellied Sapsucker.—Rather uncommon but was seen regularly. Two occupied nesting cavities were found, one about thirty feet up in a dead elm, and the other in a dead section of a living maple.

Yg. ? July 23. Yg. ♀ July 23.

Melanerpes erythrocephalus. Red-headed Woodpecker.—Found more frequently along the country roads than in the heavy woods. It was rare about our camp, which was on the border of the swamp. It probably nests in the groves about farm buildings. On May 25, 1924, a nest was found in a tall, dead elm in an open pasture. Of interest, also, was the fact that in this same stub were nesting a pair each of starlings, sparrow hawks and house sparrows, all living amicably together.

♂ June 19. Yg. ♀ August 7.

Colaptes auratus luteus. Northern Flicker.—The flicker is common and nests generally throughout the area. Young females collected were of particular interest. The writer recalls having previously examined a brood of nestling flickers which appeared to be composed entirely of males. At the time it was presumed that the division of sexes in a brood was more or less a matter of chance. A second observation of this feature suggested that a different story was involved. Dissection of young flickers, since collected, shows that young females possess the familiar black or blackish malar stripes usually regarded as peculiar to males. This condition is a rare exception to the general rule that, when adult sexes differ in plumage, the young at first resemble the female. Since both sexes possess the black malar markings at one period in their lives, it might be argued that these markings on adult males cannot be considered as secondary sexual characters. It might be more nearly correct to consider the absence of these markings as a secondary sexual character. However, females possess the markings at a time when sexual vigour is undeveloped. In any case these markings may be considered as an unmodified condition which was apparently possessed by both sexes of its earlier progenitors. The loss of these markings by females, which takes place during the post-juvenal moult, and the retention of them by males, indicates that adult female flickers have a more advanced or specialized plumage than do males. This feature

seems to be a difficult one to explain on the basis of suppression of conspicuous markings (if indeed the black markings may be considered conspicuous) by the destructive action of differentiating conditions of life under which the female lives, since both sexes take a part (Bendire, 1895) in nidification.

	♀	June 17.	Yg.	♀	August 4.
Yg.	♂	July 21.	Yg.	♀	August 11, 1928.
Yg.	?	July 28.	Yg.	♂	August 11, 1928.

Antrostomus vociferus. WHIP-POOR-WILL.—Fairly common. Its call was a nightly sound during June and July. About 8.30 p.m., two or three birds would start their calling from the wooded hills bordering the swamp and would continue on warm evenings, at least until midnight. Cool nights seemed to suppress their vocal efforts. On a few occasions the call was heard in the dark hours of early morning. Two nestling birds were found by Mr. Baillie among the leaves beside a log on a dry, wooded hillside.

Yg.	♂	July 3.		♀	July 3.
Yg.	?	July 3.			

Chordeiles virginianus. NIGHTHAWK.—A fairly common species. As many as ten birds, some of them probably young ones, were seen on the evening of July 11, while from two to eight were noted nightly throughout the summer. One of the females collected was feeding almost fully-grown young.

	♀	June 5.	Yg.	♀	August 20, 1928.
	♀	July 25.			

Chætura pelagica. CHIMNEY SWIFT.—Fairly common and generally distributed. A pair nested in a disused chimney of a building near our camp.

	?	June 10.		♂	July 12.

Archilochus colubris. RUBY-THROATED HUMMINGBIRD.— Although generally distributed throughout the area, the hummingbird is nowhere common. On June 13, the writer was standing motionless in a small clearing in the woods when a female hummingbird hovered within arms-length. I saw distinctly a patch of white feathers on the back of its head. This is the first observation of albinism in this species experienced by the writer.

Tyrannus tyrannus. KINGBIRD.—Common and generally distributed. The species nests in orchard trees about farms as well as in more isolated situations such as the tamarack bogs along the inner border of the swamp of the Holland river. A scattered flock of seventy individuals was seen on August 28, 1928. This congregation was preparatory to their fall movement southward.

	♀	June 2.	Yg.	?	July 23.

Myiarchus crinitus. Crested Flycatcher.—A common breeding bird in wooded sections. About the grounds of the Kettleby Kabin Klub it nested in abandoned woodpecker holes and in natural cavities. It also nested in orchards, as well as in the more isolated parts of swampy woods. A good deal of animal material is frequently incorporated into its nests. One example contained the feathers of domestic fowl and ruffed grouse as well as quantities of the hair of the woodchuck. On August 2, a young bird of the year was heard uttering the characteristic call of the species which, however, was noticeably weaker than that of an adult.

? July 23. Yg. ♀ August 2.

Sayornis phœbe. Phœbe.—Fairly common and generally distributed. Practically all culverts and bridges examined, including those of the radial railway, had one or more phœbe nests placed beneath them on some supporting beam or abutment. One would have thought that the passing of ten cars every day over the railway bridges would have so disturbed the birds as to discourage them from using these sites for nesting but such was not the case. The largest set of eggs examined contained six eggs.

♀ June 7. Yg. ? July 23.

Nuttallornis borealis. Olive-sided Flycatcher.—A specimen taken on June 13 was considered at the time to be a late migrant, but twice in July (18 and 23) the species was noted in the centre of the swamp of the Holland river. On the second occasion two birds were associated. One called continuously its characteristic "*whip-wheeoo,*" a sound which brought to mind the desolate spruce forests of the north. We have individual records, undoubtedly of migrants, between August 14 and 28, 1928, but the July records suggest that the species may be other than a migrant in the township.

♂ June 13.

Myiochanes virens. Wood Pewee.—A fairly common species, found in sections where there were large deciduous trees. A nest containing three incubated eggs was found on the horizontal limb of an oak some fifty feet from the ground on June 22.

♀ June 15.

Empidonax flaviventris. Yellow-bellied Flycatcher.—Not a summer resident. It was not recorded after June 2, when three migrants were seen.

Empidonax trailli alnorum. Alder Flycatcher.—Seen fairly regularly, as many as six having been recorded on a single day. Dr. Paul Harrington found a newly completed nest which he believed to belong to this species, but unfortunately it had been destroyed by some unknown agency when the site was later visited. However, a breeding

record for the species was established on July 29, when Mr. Baillie observed an adult bird near our camp at Pottageville feeding young.

♂ June 1. ♂ July 26.

Empidonax minimus. LEAST FLYCATCHER.—Seen daily throughout the summer, as many as six having been observed on several different days during the earlier part of the season. The species nests in the alder thickets of wet sections where the heavy timber has been removed. A nest with four fresh eggs was found fifteen feet from the ground in the crotch of an alder on June 9.

♂ June 9. Yg. ? August 4.

Otocoris alpestris praticola. PRAIRIE HORNED LARK.—One was heard by Mr. R. V. Lindsay and the writer on August 1, as we were tramping a dry, sandy hilltop in a field of oats in the north-central part of the township. No others have been observed in summer. The form likely to be found here in summer is *praticola*.

Cyanocitta cristata. BLUE JAY.—A fairly common species. Two nests were found in heavily wooded areas. The first, which contained five fresh eggs, was found on July 8, situated at the high elevation of over fifty feet on a horizontal limb of an elm. The other contained four partially fledged young on July 20, and was situated in a sapling hemlock ten feet from the ground.

♂ June 3. Yg. ? July 12.

Corvus brachyrhynchos brachyrhynchos. CROW.—A common breeding species. The young are on the wing by the last week of June. Tall hemlocks situated in fairly dense woods on dry ground along hillsides seem to be preferred by crows as nesting sites.

♀ June 15.

Sturnus vulgaris. STARLING.—We first discovered the starling in King township on May 25, 1924, when a pair was found nesting in a dead elm near Pottageville (Snyder and Baillie, 1925). A pair nested in the same tree in the summer of 1926. By that time several other nesting situations were occupied. The species was still not numerous but was fairly well distributed in 1926. Since then it has become more common. The song of the wood pewee and the white-throated sparrow were frequently imitated by the starling. Both of the species imitated are summer residents of the area with which the starling comes in contact. The male collected was carrying food to its young, showing that this sex participates in nesting duties.

♂ June 17.

Dolichonyx oryzivorus. BOBOLINK.—Sections of the extensive grassy flat-land bordering the Holland river are populated with bobolinks, the species nesting there in some numbers. A few were seen elsewhere in cultivated meadows. Their numbers on the grassy flats will probably be

affected by the draining of this land. In order to secure male specimens in changing plumage the species was watched closely during mid-July. A slight change of plumage was noted between July 18 and 26 (at the time nestling took to the wing), but at the critical time (the last week of July) the species moved, leaving the flats entirely and was not noted again except for individuals and small flocks passing overhead. These were quite probably migrants from farther north.

2 ♂'s June 7.
♀ July 4.
3 ♂'s July 12.
3 ♂'s July 26.
4 ♀'s July 26.
Yg. ♂ July 26.
Yg. ♀ July 26.

Molothrus ater ater. Cowbird.—Common and generally distributed.

♂ June 3.
Yg. ? June 19.
♀ July 14.
Yg. ♀ August 3.

Agelaius phœniceus phœniceus. Red-winged Blackbird.—This species was restricted to the cat-tail marshes which, however, are nowhere extensive within the township. In several situations, small colonies composed of from three to six pairs were found occupying small marshes, none of which embraced an area of more than a few square yards. It is difficult to explain why this species has not established itself in numbers throughout the wet flats bordering the Holland river, even though that area is not a cat-tail habitat. In northern Ontario, where cat-tail marshes are rare, the species finds suitable nesting sites in open, wet places of a different nature. There they attach their nests to shrubs, sedges, grasses, etc., which grow in or near the water. Situations similar to these are found extensively along the Holland river. These differences might be explained by the theory that red-wings to the north have nesting habits slightly at variance to those of the same species farther south since they are descendants of pioneering individuals which extended the range of the species, these pioneers possessing and passing on characteristics which made them adaptive to new conditions. However, what has been said of the red-winged blackbird is equally fitting in connection with other species of birds.

2 ♂'s June 18.

Sturnella magna magna. Meadowlark.—Not particularly common but generally distributed over the farmland where it nested.

♀ June 7.
Yg. ? June 19.

Icterus galbula. Baltimore Oriole.—Not particularly common but generally distributed. Towering elms are apparently preferred as nesting sites, but one nest was found in a quaking aspen near our camp.

Yg. ♂ July 3.

Quiscalus quiscula æneus. Bronzed Grackle.—Noted daily throughout the summer. Although they were locally numerous only one

nesting situation was found. This was in the broken top of a dead stub which projected from the water in a marshy clearing in the swamp. The species started moving about in flocks about July 16. In 1928, a flock estimated to contain one thousand birds was seen by Mr. H. H. Brown on August 18.

♀ June 2. Yg. ♀ July 21.

Carpodacus purpureus purpureus. PURPLE FINCH.—At least two pairs summered near our camp, the males being heard daily, singing from the tops of evergreen trees. The species may be a rare resident all along the extensive swamp bounding the township at the north.

♂ June 22.

Astragalinus tristis tristis. GOLDFINCH.—Common. A nest containing three fresh eggs was found situated six feet from the ground in a Spiræa shrub at the edge of a small permanent lake on August 7.

♂ June 1. ♂ August 3.
♀ June 1.

Spinus pinus. PINE SISKIN.—Although this species has not been observed during the summer months it must be listed as a nesting bird of the township, Dr. Paul Harrington having found a newly completed nest in the tamarack bog which flanks the flat-lands of the Holland river, on April 3, 1927. The nest was situated approximately fifteen feet from the ground at the base of a limb next to the trunk of a tamarack. It was constructed of small tamarack twigs and was lined with fine plant fibre, down, horse hair and other fine hairs. No eggs had been deposited in the nest but siskins were about at the time. It seems probable that a few of these birds remain within the township during some summers.

Passer domesticus. HOUSE SPARROW.—Fairly plentiful about farmsteads and in the towns within the township. A few pairs nested about the lumber mill and other buildings near our camp. A female specimen collected possessed a curious malformed upper mandible, the tip having grown outward and downward 6 mm. beyond where the bill would normally terminate.

♂ June 8. ♀ July 22.
Yg. ♂ June 17.

Poœcetes gramineus gramineus. VESPER SPARROW.—A fairly common breeding bird, generally distributed over the dry open land. Young just out of the nest were seen on July 9.

? June 7. 3 ♂'s August 3.
♀ July 8. ♂ August 7.

Passerculus sandwichensis savanna. SAVANNAH SPARROW.—Fairly common but perhaps not so generally distributed as the previous species. It nests in the open pastures and fields which are not closely cropped, and also on the grassy flats of the Holland river. Young which

had but recently left the nest were secured. On June 19 an adult was observed feeding a young cowbird.

♂ June 1. ♀ July 12.
♂ July 4. Yg. ♂ July 23.
2 ♂'s July 8. Yg. ? July 23.

Zonotrichia albicollis. White-throated Sparrow.—A fairly common bird of the clearings in and about the main swamp of the Holland river. One nest found on June 3 contained three fresh eggs and a cowbird's egg. It was situated beside a log in a raspberry thicket in a fairly dry clearing within the main swamp. Another nest containing three eggs, found by Mr. H. H. Brown on July 4, was situated on the moss of a tamarack growth on the inner edge of the swamp. This appears to be the first record of the nesting of this species for the Toronto region.

It is of interest to note that in King township and elsewhere, male white-throated sparrows incubate, or assist in incubating, the eggs. Associated with this habit we have found, in a few cases, that males were less brightly marked than their mates.

♂ June 2. Yg. ♂ July 14.
♂ June 3.

Spizella passerina passerina. Chipping Sparrow.—A common species, nesting in the evergreens bordering the swamp and also about dwellings. The eggs from a nest near our camp were found broken on the ground while the nest contained two eggs of the cowbird.

♂ June 9.

Junco hyemalis hyemalis. Slate-coloured Junco.—Pairs of juncos were seen in midsummer in two situations along the height of land which crosses the township. Their immediate habitats were high and dry where trees had been partially removed, leaving the sterile soil exposed to the summer sun. The occurrence of these northern birds in such situations is in strong contrast to that of other northern species found which are very largely confined to the bog in King township.

♂ June 1. ♂ July 28.

Melospiza melodia melodia. Song Sparrow.—A common species. It was found nesting about wet, wooded pastures, brushy hillsides, etc. On August 1, a young bird of the year was heard singing a song which was recognizable as a song sparrow's song, but possessed a harsh rasping quality, suggesting that of the long-billed marsh wren. The series of nine summer adults is notably uniform in tone and general coloration.

♂ June 9. Yg. ♂ July 22.
2 ♂'s June 23. Yg. ♂ July 29.
♂ June 24. 2 ♂'s August 3.
♀ July 21. ♀ August 4.
♂ July 21. Yg. ? August 6.
? July 21.

Melospiza lincolni lincolni. LINCOLN'S SPARROW.—One of our most interesting discoveries during the summer was the finding of several pairs of Lincoln's sparrows established in and about clearings in the centre of the main swamp. The species probably occurs in restricted areas other than those discovered by us since we could explore but a small part of the extensive swamp. On July 14 and 16, adults were observed carrying food and feeding young. This constitutes the most southerly breeding record for the species in Ontario. It has not previously been recorded as a resident bird of the Toronto region.

♂ July 4. ♀ July 14.
♂ July 14.

Melospiza georgiana. SWAMP SPARROW.—A fairly common species, found in the grassy areas of swamps. Young not long out of the nest were collected.

2 ♀ June 8. Yg. ♀ July 6.
Yg. ? July 16.

Pipilo erythrophthalmus erythrophthalmus. TOWHEE.—Rather scarce. The few birds noted were in the deciduous woods where large trees and some undergrowth were present. A nest with four fresh eggs was found on May 25, near Kelly lake, by Mrs. Stuart L. Thompson.

♀ June 23. Yg. ♂ August 3.
♂ June 23.

Hedymeles ludovicianus. ROSE-BREASTED GROSBEAK. — This species was well distributed and not uncommon, from one to five specimens having been seen daily. A nest with a completed set of four fresh eggs was found on June 3, about five feet from the ground, in a small white cedar. This species has not previously been recorded as nesting in the Toronto region.

An adult female taken in May in King township is of especial interest, in having one feather of the breast marked with red of the hue possessed by males.

♂ July 14. ♂ July 20.
Yg. ♀ July 14.

Passerina cyanea. INDIGO BUNTING.—Rather scarce. A nest with four incubated eggs was found three feet from the ground in a hazelbush in a small clearing on June 19.

♂ June 2. ♀ June 19.

Piranga erythromelas. SCARLET TANAGER.—Single pairs of these birds were found in several localities in fairly dry dense woods. The species is to be regarded as scarce for the township as a whole. It has not previously been recorded as a summer resident of the Toronto region.

♂ June 12.

Progne subis subis. Purple Martin.—The only colony of martins noted was seen in early summer in the town of Aurora. Later in the season, individual birds were seen about the surrounding country.

Yg. ♂ July 12.

Petrochelidon lunifrons lunifrons. Cliff Swallow.—The only summer record of the cliff swallow for King township is that of a single bird observed on August 30, 1924. It was probably a migrant.

Hirundo erythrogastra. Barn Swallow.—Common, nesting about farmsteads throughout the area. During the first week of August small family flocks assembled to feed over the wet flats bordering the Holland river. Flocks composed of twenty-five to one hundred individuals were noted during the middle and latter part of August.

♀ June 3. Yg. ? July 23.

Iridoprocne bicolor. Tree Swallow.—Fairly numerous in and about the main swamp, where they find suitable nesting sites in standing dead trees. Small flocks congregated in late summer and were found with the barn swallows sweeping over the grass flats and perching on wires which cross the border of the open area.

Yg. ♀ July 4.

Riparia riparia. Bank Swallow.—This species was found nesting in a low sandy-clay bank along the radial right-of-way. Full complements of fresh eggs were found by June 6. This species began to flock about the middle of July and was found in great numbers over the grassy flats towards the end of that month.

♀ July 12.

Stelgidopteryx serripennis. Rough-winged Swallow.—A nest of this species was found on June 17 in the low bank where the bank swallow also nested. It contained a set of five fresh eggs. The species has since been noted on one occasion in May.

♀ June 17.

Bombycilla cedrorum. Cedar Waxwing.—Common in and about the swamp and nested in the cedars bordering it. It was found on one occasion to have used a small elm as a nesting site. The earliest eggs were found on July 3.

♂ June 8. ♀ August 4.
♂ August 4.

Lanius ludovicianus migrans. Migrant Shrike.—Found sparingly along the country roads, in the hedge-rows and in the thickets. Young which had but recently left the nest were observed.

Yg. ♀ July 6.

Vireosylva olivacea. Red-eyed Vireo.—A common species in the wooded sections. It was found nesting.

♂ June 1. Yg. ? August 3.

Mniotilta varia. BLACK AND WHITE WARBLER.—Seen regularly in and about the heavily-wooded swamp where it was quite numerous. A nest containing three young birds and an infertile egg was found by Dr. Paul Harrington and Prof. T. F. McIlwraith on June 19. The nest was constructed of shredded fibres of some woody plant and lined with finer fibres of the same material. It was placed on the ground beneath the drooping branches of a ground hemlock which grew on a dry mound wooded with mixed forest. Many families with young were noted during the summer.

♂ June 2. Yg. ? August 3.
Yg. ? July 14.

Vermivora ruficapilla ruficapilla. NASHVILLE WARBLER.—Locally numerous; found in open, wooded, wet pasture-land bordering the swamp. That the species nests in such situations was indicated by the taking of partially fledged young there. No evidence that the species nests in the Toronto region has previously been recorded.

♀ June 3. Yg. ♂ July 14.

Dendroica æstiva æstiva. YELLOW WARBLER.—Rather scarce and irregularly distributed. A few were found inhabiting thickets of dogwood and willow in wet swales. Adults were seen carrying food to young.

♀ June 18.

Dendroica coronata. MYRTLE WARBLER.—The finding of this species in summer within the township was one of the interesting observations of 1926. The species was rare and confined to the inner edge of the swamp bordering the Holland river where conditions probably more nearly correspond to those of more northern latitudes.

♂ July 16.

Dendroica cerulea. CERULEAN WARBLER.—On June 7, Mr. Baillie collected a singing male from a large basswood tree which stood on the edge of a heavy mixed woods. This is the only record for this species in the township and the first summer record for the Toronto region.

♂ June 7.

Dendroica pensylvanica. CHESTNUT-SIDED WARBLER.—A few of these warblers were noted rather regularly throughout the summer. A nest, situated three feet from the ground in a choke-cherry shrub contained three incubated eggs on June 28. One other nest was found in raspberry canes in a small clearing in dry woods.

♂ June 1. ♂ July 6.

Dendroica fusca. BLACKBURNIAN WARBLER.—A few pairs were noted in dense, mixed woods where large hemlocks were numerous. This species has not previously been regarded as a summer resident of the

Toronto region. Specimens previously recorded in June have usually been considered to be late migrants.

♂ June 5. ♂ July 6.

Dendroica virens. Black-throated Green Warbler.—Not uncommon, pairs having been found in dry mixed woods and in the heavily wooded swamp. Two nests were found, each approximately thirty feet from the ground, situated on horizontal limbs of hemlocks a few feet out from the trunks. Each contained three fresh eggs. The first was found on June 19 and the other on August 9. The species has not previously been recorded as a summer resident or breeding bird of the Toronto region.

♂ June 19.

Seiurus aurocapillus. Oven-bird.—Fairly common in suitable woods. A nest containing four fresh eggs was found on June 11 on the ground beneath the boughs of a ground hemlock in a dense mixed woods.

♂ June 1. Yg. ♀ July 7.

Seiurus noveboracensis noveboracensis. Water-Thrush.—Fairly numerous in and about the main swamp. Two young birds were collected; one taken July 27 possessed the woolly first plumage characterized by the heavily-streaked throat, chest and sides, which gives the bird, generally, a dark, sooty appearance; the other, taken July 29, was acquiring a more mature plumage. These birds were unquestionably reared in a section of wet woods near our camp. This appears to be the first evidence that the species nests in the Toronto region.

♂ June 2. Yg. ♀ July 29.

Yg. ♂ July 27.

Oporornis philadelphia. Mourning Warbler.—Rare. A pair was established on a hillside near our camp where berry bushes and small second-growth grew in dense clumps.

♂ June 2.

Geothlypis trichas trichas. Maryland Yellow-throat.—A fairly common breeding bird, found in wet clearings and partial clearings, pastures, and along the borders of the extensive grassy flats of the Holland river.

♂ June 1. Yg. ♀ July 12.

Wilsonia canadensis. Canada Warbler.—Not plentiful but noted regularly in and about the swamp. Young just out of the nest were seen on several occasions in the latter part of the summer. This is the first evidence that the species nests in the Toronto region.

♂ June 1. ♂ June 2.

Setophaga ruticilla. Redstart.—Rather scarce but noted fairly regularly. In only one instance did we secure evidence of the nesting of the species.

Im. ♂ June 22. ♂ July 2.

Dumetella carolinensis. CATBIRD.—Not particularly common but observed regularly and found nesting.

♂ June 1. ♂ July 8.

Toxostoma rufum. BROWN THRASHER.—It was rather surprising that the brown thrasher was not seen during the summer of 1926. However, that it is occasionally a rare summer resident of the township is indicated by the fact that one was seen by Mr. H. H. Brown during the summer of 1925.

Troglodytes ædon ædon. HOUSE WREN.—A common breeding bird of the area.

♂ June 3. 2 ♂'s August 3.
Yg. ♀ July 12.

Nannus hiemalis hiemalis. WINTER WREN.—Few. Pairs were found in widely separated localities along the swamp of the Holland river. The species frequents the dark, damp, tangled woods in which it also breeds. Families of young just capable of flight were found on two occasions in late summer.

Yg. ♂ June 25. Yg. ♂ August 2.

Cistothorus stellaris. SHORT-BILLED MARSH WREN.—A large scattered colony of these wrens was established in a section of the extensive grassy flats bordering the Holland river. Intensive searches were made for nests but none was found. However, on July 4, Mr. Baillie and Mr. W. P. Young saw an adult carrying food or nesting material in its bill, and on July 16 a female was collected which had eggs almost ready for extrusion. There are no previous records of the breeding of this species in the Toronto region; even its occurrence has been noted but rarely.

2 ♂'s June 29. ♀ July 16.
3 ♂'s July 12. 2 ♂'s August 6.
♀ August 6.

Telmatodytes palustris palustris. LONG-BILLED MARSH WREN.. Found to be fairly common along the Holland river, where it also nests. None was seen elsewhere.

2 ♂ June 29.

Certhia familiaris americana. BROWN CREEPER.—A few pairs were found distributed through stands of large timber. A nest containing four young was found on June 22, nine feet from the ground in a large, broken elm stub. The nest was composed of small twigs and bits of outer bark and was lined with fine shreds of inner bark. It was long and narrow and was curved in conformity with its position, behind a large, loose sheet of bark. This is the first definite record that the species breeds in the Toronto region.

Yg. ♂ June 22. ♂ July 30.

Sitta carolinensis carolinensis. White-breasted Nuthatch.—Seen regularly but not very common. Young just out of the nest were seen, one having been collected.

♀ June 22. Yg. ? July 23.

Sitta canadensis. Red-breasted Nuthatch.—Single individuals were seen in two situations in the centre of the swamp where there were tall standing dead conifers. The discovery of this species was perhaps one of the most unusual finds made in 1926, since it has not previously been recorded as a summer bird of the Toronto region.

Penthestes atricapillus atricapillus. Chickadee.—A common species. A set of six fresh to incubated eggs was found on July 14. The nest was situated in a stump within a woodpecker-drilling less than two feet from the ground, within the main swamp.

♂ June 12. Yg. ♀ August 3.
♀ July 14. Yg. ♂ August 3.
Yg. ♀ July 30.

Regulus satrapa satrapa. Golden-crowned Kinglet.—Single birds were seen on a few occasions in two separate sections of the swamp. There appears to be no previous record of the occurrence of this species in the Toronto region in summer.

♂ July 27.

Hylocichla mustelina. Wood Thrush.—A few pairs inhabited different sections of the thick, dark woods bordering the swamp. During the first week of June we were frequently awakened in the morning by the voice of this splendid songster. At this time of day, when the sun has but started on its upward climb, the quality of the song strikes one as being essentially that of cheerfulness—a sort of morning greeting. Especially does it seem a salutation when out of its theme one hears "Oh Youhoo," a pause, and then, again the theme. Later in the summer the wood thrush sang most frequently in the evening. As darkness approached, the mystical and spiritual qualities of its song seemed to be accentuated. The voice carries well in the stillness of twilight and one is convinced that this bird deserves its high rank as a songster.

Hylocichla fuscescens fuscescens. Veery.—A fairly common species. A nest containing four fresh eggs was found on June 29 on the ground beneath a gooseberry shrub. The general situation was a small arm of the main swamp where sapling ash and alders grew in the wet soil.

♂ June 1.

Planesticus migratorius migratorius. Robin.—A common nesting species.

♀ June 3. Yg. ♂ July 21.
♂ July 21.

Sialia sialis sialis. BLUEBIRD.—Fairly common. It was most frequently met with in stump-covered pastures, where it nests.

♂ June 3. Yg. ♀ June 17.

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A FAUNAL INVESTIGATION OF KING TOWNSHIP, YORK COUNTY, ONTARIO

IV. THE AMPHIBIANS AND REPTILES OF KING TOWNSHIP

By E. B. S. Logier

The specimens and data on which the present paper is based were gathered during a number of short visits to King township, each of from one to three or four days' duration, between October, 1924, and September, 1929. Unfortunately, it was not possible for the writer to remain constantly on the ground with the Museum party in 1926. He also had the co-operation of Mr. W. J. LeRay, who visited the region several times in the summers of 1928 and 1929.

The following list includes thirteen species of amphibians and reptiles, but it is probable that future collecting will add other species to it.

Close to our camp were a number of temporary pools which filled in the spring with the melting of the snow. These pools occurred for the most part in depressions in lightly wooded land so that trees, logs and stumps, bushes and grassy ground were included in the flooded areas. The photograph reproduced in plate II, fig. 2, shows a section of the largest of these pools. The water was shallow around the margins and toward the centre reached in some places a depth of about two feet. Most of the observations on the swamp tree frog and wood frog were made at these pools.

Kelly lake, where some collecting was done, lies about $2\frac{3}{4}$ miles south of Pottageville, at the foot of one of the morainic hills. It is about two hundred and eighty yards in its greatest length. The margins are in part of quaking bog and the trees occurring there include black spruce, white cedar, tamarack and others characteristic of such low, wet places, as mentioned on page 169 in the general introduction.

Just east of Kelly lake is a large pond lying in more open land, and here newts and swamp tree frogs were numerous, and some painted turtles were collected. Another large, permanent pond is situated about three-quarters of a mile to the north, immediately east of the seventh concession. It has open meadow land sloping up from it on the east and north. The water depth at the middle was not measured but would be fully three feet. This pond sustained a considerable growth of aquatic

weeds and furnished a good breeding place for *Triturus*, *Ambystoma* and several species of frogs.

All measurements given are from preserved specimens.

Amphibians

Triturus viridescens viridescens (Rafinesque). GREEN NEWT. —This species was found to be very plentiful in the pond north of Kelly lake where collections were made on several occasions. The specimens seen and collected by the writer at this pond were on the average rather small, ranging from 69.5 to 94.5 mm. in length. The two smallest specimens, which were taken in the water on June 20, 1926, and May 8, 1927, respectively, were females of 69.5 mm. and both contained enlarged and ripening eggs. Males of over 75 mm. showed good development of external sexual characters,

The pond in question was overcrowded with newts, a condition which might account for the limited growth attained by all the individuals seen.

In the well-drained, sloping meadow leading down to this pond a number of the red, terrestrial form were found under cover on the ground, at different times during the summer and early autumn.

No larvae were found in the water on June 20, 1926, and May 8, 1927, but in 1928 they were found to be numerous from July to September by Mr. W. J. LeRay, who informed the writer that on September 23 larvae up to $1\frac{1}{4}$ inches (32 mm.) in length were abundant in the pond just east of Kelly lake and specimens with their gills almost absorbed were found under cover about the margins. The adults had all left the water and olive-coloured specimens were found under cover even at long distances from the water (about $\frac{1}{4}$ mile) and the farther from the water the lighter in colour.

On September 13, 1929 (a warm, rainy morning), the writer, in company with Mr. LeRay, visited Kelly lake and some of the ponds in the vicinity. On this date neither adults nor larvae were found in the water, but individuals of all sizes from newly-transformed young to full-grown adults were found travelling over land away from the pond on the east side of Kelly lake. They were wandering on the roads, and the larger ones were working their way up the wooded slope to the north where they were found hundreds of feet from the water.

Many of the newts collected had assumed a bright orange or almost red coloration. Among these highly-coloured individuals were specimens of from 79 to 89 mm. in length. Some of these were females in which the eggs were enlarging and turning brown.

The largest specimens in this landward migration were of an olive or greenish colour and measured from 100 to 115 mm. in length.

A few adult newts were seen in the temporary pools in the vicinity of our camp at different times.

Out of a total of seventy specimens collected by the writer, in 1926 and 1927, twenty-eight, or 40 per cent., were males.

Ambystoma jeffersonianum (Green). Jefferson's Salamander.—This species was seen occasionally in shady, moist situations. One specimen was found in the earth cellar of our cabin on October 16, 1926. Another specimen was taken beside Kelly lake on May 8, 1927.

Larvae were plentiful in the pond north of Kelly lake on June 20, 1926. Of ten specimens taken, seven were *jeffersonianum** and ranged from 38 to 45 mm. in length.

Egg masses were seen in the temporary pools near our camp on April 25, 1926. They were attached to twigs and grasses at depths of from six inches to a foot.

Ambystoma maculatum (Shaw). Spotted Salamander.—This species was found in similar types of habitat to that chosen by the preceding. One specimen was taken from a decayed log in the woods near Pottageville on July 21, 1926, and two beside Kelly lake on May 8, 1927.

Three larvae, ranging from 26 to 29 mm. in length, were taken in the pond north of Kelly lake on June 20, 1926.

Masses of eggs in advanced stages of development were seen in pools beside the radial railway near our camp on May 15, 1926.

Plethodon cinereus (Green). Red-backed Salamander.—Red-backed salamanders were common in the mixed hardwood forests in the vicinity of Pottageville, where they were taken from decayed logs and under cover on the damp ground.

Out of thirty specimens collected only one was of dark brown coloration, all the others were red-backed.

On July 21, 1926, ten females with bundles of eggs were found in decayed logs. In most cases the eggs were far advanced in incubation. the young animals being within a few days of emerging.

Bufo americanus Holbrook. American Toad.—Toads do not appear to be very plentiful in the region. An occasional specimen was seen, and they were sometimes heard trilling in the evening or after nightfall during May and June.

Pseudacris triseriata (Wied). Swamp Tree Frog.—This species was quite plentiful. It resorted in numbers to the many temporary pools in the district from which its voice could be heard at almost any hour of the day or night through April, increasing to a chorus toward evening and after nightfall, unless the coldness of the night silenced it.

The lowest air temperature at which voice was recorded was 23°F.

*Identification is based on the number of costal grooves, which is usually 12 in *jeffersonianum* and 10 in *maculatum*.

(record by J. L. Baillie, Jr., April 2, 1927), and the second lowest was 29°F. The frogs gradually became silent through the early half of May. After heavy rains on June 14, 1926, they commenced singing again, after nearly a month of silence. The last voice recorded for the year 1926 was on October 17, after which date no more visits were made to the region that year. Repeated search for eggs in the pools where the frogs were calling failed to reveal any.

A few adult specimens were collected and many were seen.

Hyla crucifer Wied. SPRING PEEPER.—This species occurred rather sparingly. In 1926 its voice was heard occasionally from May 3 till June 17. The latest date on which its voice was heard was on October 11, 1924, when a few individuals were heard to utter several feeble calls from the ground in the woods.

Specimens were taken in the woods near Pottageville and at Kelly lake.

Hyla versicolor versicolor (Le Conte). TREE TOAD.—This species was not common. From May 30 until June 20, 1926, a few were heard calling occasionally in the evening. After the latter date it was not heard again till July 20, when a single specimen was heard again in the evening.

In a pond near Kelly lake young frogs were found transforming on August 12, 1928, by Mr. W. J. LeRay.

Rana clamitans Latreille. GREEN FROG.—This frog was common. It was seen about the temporary pools near our camp and was plentiful at Kelly lake and the ponds in its vicinity.

On June 16 and 18, 1926, a few males were croaking in the pools near our camp. On June 20, many of them were croaking in a pond north of Kelly lake and three females collected there on that date were full of eggs. Tadpoles were seen in a quiet stream where it entered the open marsh on its way to the Holland river.

Rana palustris Le Conte. PICKEREL FROG.—Three specimens were seen in the pond north of Kelly lake on June 20, 1926, two of these were collected, both young males. The species was not seen elsewhere.

Rana pipiens Schreber. LEOPARD FROG.—This was the commonest Rana. It was plentiful about pools and ponds in the early part of the summer, and in August was found ranging widely over low-lying, open country, and damp meadow land. It was found about rain pools in the woods near Pottageville on October 11, 1924. It was heard croaking in the temporary pools near our camp on April 18, 1925, and on May 8 and 9, 1926. The latter record was at 3 a.m. with a frost settling. Full-grown tadpoles were found in a creek near our camp in August, 1925.

Rana septentrionalis Baird. MINK FROG.—This species seems to be not uncommon at Kelly lake where 31 specimens have been collected in the years 1927 to 1929. All of these, with one exception, were taken by Mr. LeRay.

Rana sylvatica Le Conte. Wood Frog.—Wood frogs were numerous about temporary pools in the early spring and were found occasionally in moist or shady places throughout the summer.

The writer's first visit to the region in the spring of 1925 was on April 4, when the frogs were in the water calling, and were so noted on each subsequent visit till April 18, after which date he had no opportunity to visit the region again that season. On April 24, 1926, they were in full chorus in the temporary pools near our camp. On May 8 they were silent in these pools but were croaking in a section of the cedar swamp near by, where they had not previously been heard.

Spawn was found in considerable quantities in one of the pools near camp on April 25, 1926, and on May 9 was found to be hatched, young tadpoles of about 9 or 10 mm. in length clinging to the disintegrating jelly and swimming freely when disturbed. Many of the eggs had failed to develop. Some newly transformed wood frogs were collected about these pools on July 21, 1926.

Reptiles

Liopeltis vernalis (Harlan). Smooth Green Snake.—A specimen was taken near Kelly lake on September 23, 1928, by Mr. W. J. LeRay.

Lampropeltis triangulum triangulum (Lacépède). Milk Snake.—Two specimens were taken at Lloyd's sawmill near Pottageville on June 2 and 9, 1926. They measured 978 and 984 mm. in length respectively. A third specimen was seen but escaped.

Mr. J. A. Lloyd told the writer that these snakes are common about the mill but are not usually seen except on hot days. A partly decomposed specimen were seen near Kelly lake by Mr. J. L. Baillie, Jr.

Storeria dekayi (Holbrook). DeKay's Snake.—This species was not found by the writer, but Mr. W. J. LeRay reports having seen it.

Storeria occipito-maculata (Storer). Red-bellied Snake.—This species was fairly common and has been seen in the vicinity of Kettleby Kabin each year from 1924 to 1929 and a number of specimens have been captured. In the autumn these snakes would resort to the radial right-of-way for the purpose of sunning themselves on warm days and many of them were killed by the electric cars.

Thamnophis sauritus (Linn.). Ribbon Snake.—One specimen was taken and another seen by Mr. W. J. LeRay at a pond near Kelly lake on September 16, 1928.

Thamnophis sirtalis sirtalis (Linn.). Garter Snake.—This was the commonest snake. It was found in a variety of situations,—in light woods, in meadows and clearings, on roads, on the radial right-of-way, and at the Holland marsh. It was occasionally seen about camp.

Twelve specimens were collected, three males and nine females. The

largest male measured 515 mm. The females, with the exception of one which measured 479 mm., were all larger. The largest specimen was 965 mm.

The dorsal scales in every case were 19-17. The ventral plates numbered 147 to 159. One specimen had eight supralabials on each side but was in other respects normal. Another had four postoculars on each side, while three others showed slight abnormalities. One specimen was very dark, the dorsal and lateral stripes though well-defined were very dusky and the posterior two-thirds of the ventral surface was almost black. All the other specimens were normally coloured.

Three of the five females taken in June, 1926, were pregnant, while a sixth taken in July of the same year apparently was not. One taken on August 30, 1924, was emaciated and had evidently recently given birth to young.

A specimen taken near the Holland marsh swallowed a leopard frog while being carried to camp in a cotton bag, and was found upon dissection to have recently swallowed a young bird also.

Chelydra serpentina (Linn.) SNAPPING TURTLE.—This species was seen at Kelly lake by Mr. W. J. LeRay.

Chrysemys marginata marginata (Agassiz). PAINTED TURTLE. —This turtle was common at Kelly lake and in the ponds in that vicinity. It was seen in the Holland river by Mr. J. L. Baillie, Jr.

Photo by H. H. Brown

Fig. 1. A view of the clearing and woods in spring at Kettleby Kabin

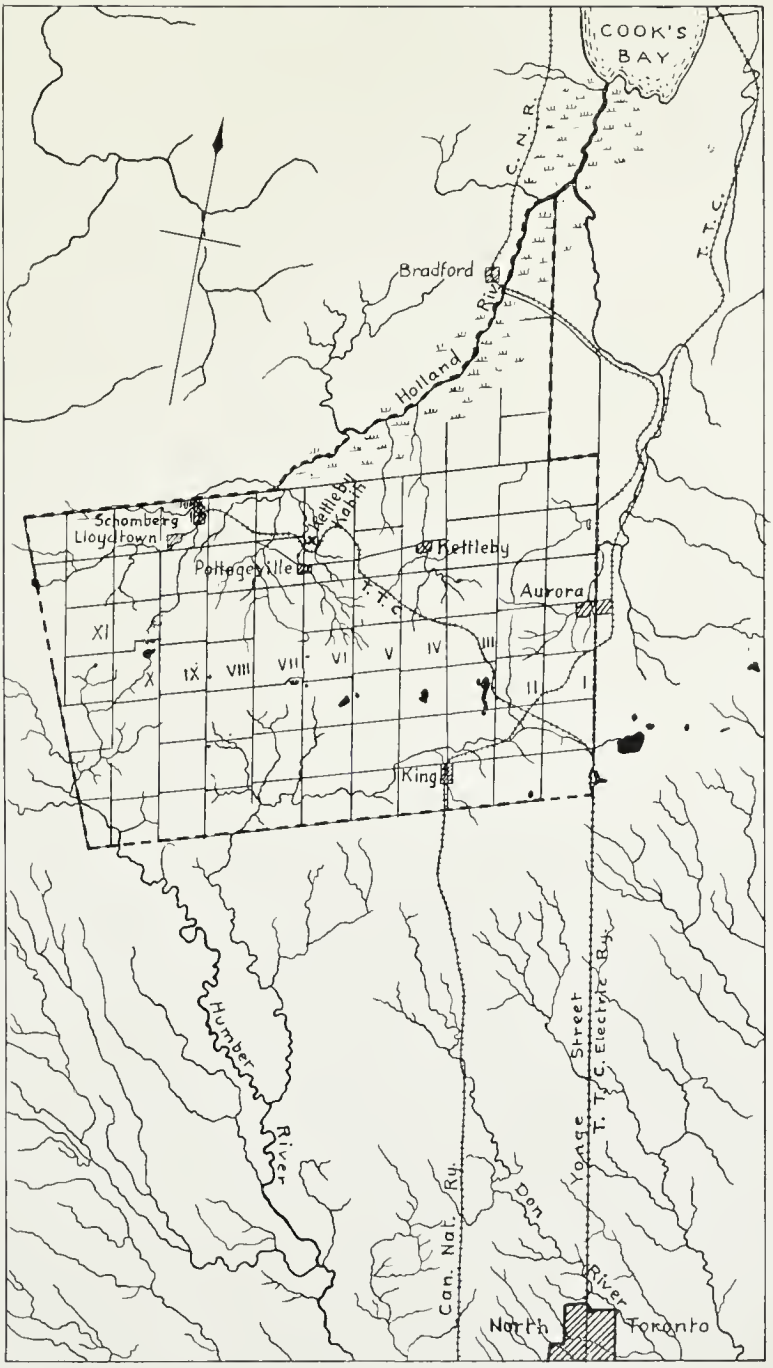
Fig. 2. A typical spring snow-pool near Kettleby Kabin

Photo by S. L. Thompson

Fig. 3. A view of Kelly lake, a characteristic moraine lake

Photo by S. L. Thompson

Fig. 4. Reclamation on moraine ridges



Map of King township, showing drainage. 1 inch = 5.9 miles

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